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EXAMINER

GUERRERO, MARIA F

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 05/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/029,147

Applicant(s)

LEE ET AL.

Examiner

Maria Guerrero

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 December 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. This Office Action is the First Action on the merits.

Claims 1-12 are pending.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 and 4-6 are rejected under 35 U.S.C. 102(b) as being anticipated by Lo et al. (U.S. 5,783,097).

Lo et al. teaches depositing a layer on a wafer and planarizing the layer by removing a portion of the deposited layer (Fig. 2A-3B, col. 1, lines 50-67, col. 2, lines 1-25, col. 3, lines 25-45). Lo et al. discloses the resulting planarized layer comprising a

uniform region of uniform thickness extending along a wafer surface and nearly to an edge of the wafer (Fig. 3A-3B). Lo et al. teaches a non-uniform region of non-uniform thickness corresponding to the edge of the wafer (Fig. 3A-5). Lo et al. discloses coating a photoresist layer on the planarized layer, removing a portion of the coated photoresist layer corresponding to edge of the wafer and exposing at least the non-uniform region of the planarized layer (Fig. 4-6, col. 2, lines 26-37, col. 3, lines 45-59). Lo et al. shows wet etching at least the exposed non-uniform of the planarized layer, wet etching a portion of an exposed portion of the uniform region, and stripping a remaining portion of the coated photoresist layer (Fig. 7-8, col. 3, lines 60-65). Lo et al. teaches forming a pattern layer comprising a portion of the uniform region of the planarized layer (Fig. 8, col. 4, lines 1-5).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lo et al. (U.S. 5,783,097) in view of Liu et al. (U.S. 6,287,961).

Regarding claim 3, Lo et al. does not specifically show the photoresist layer having the specific thickness as claimed. However, Liu et al. shows forming a

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photoresist layer having a thickness of from about 7000 to about 15000 angstroms (col. 9, lines 50-55).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Lo et al. reference by specifying the thickness of the photoresist layer as taught Liu et al. because the selection of any appropriated thickness for a known process is within the capabilities of a person of ordinary skill in the art.

6. Claims 1-2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weng et al. (U.S. 5,879,577) in view of Applicant Admitted Prior Art.

Weng et al. teaches depositing a planarized layer on a wafer comprising a uniform region of uniform thickness extending along a wafer surface and nearly to an edge of the wafer (Fig. 2, col. 1, lines 10-18, col. 3, lines 30-34). Weng et al. teaches a non-uniform region of non-uniform thickness corresponding to the edge of the wafer (Fig. 2). Weng et al. discloses coating a photoresist layer on the planarized layer, removing a portion of the coated photoresist layer corresponding to edge of the wafer and exposing at least the non-uniform region of the planarized layer (Fig. 2-4, col. 3, lines 34-55). Weng et al. shows wet etching at least the exposed non-uniform of the planarized layer and stripping a remaining portion of the coated photoresist layer (Fig. 5-7, col. 3, lines 55-65, col. 4, lines 2-6). Weng et al. teaches forming a pattern layer comprising a portion of the uniform region of the planarized layer (Fig. 7, col. 4, lines 2-10).

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Regarding claims 1-2, Weng et al. does not specifically show planarizing the deposited layer using chemical mechanical polishing (CMP) process. However, Weng et al. teaches the deposited layer being planar and the method could be applied to any substrate having a top layer (col. 1, lines 15-18, col. 4, lines 5-10). In addition, Applicant Admitted Prior Art teaches depositing a layer and planarizing using chemical mechanical polishing (CMP) process (Fig. 1-2, pages 4-5).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Weng et al. reference by including the step of planarizing using chemical mechanical polishing (CMP) process as taught Applicant Admitted Prior Art. The modification would provide a process of removing an annular area around the periphery without increasing the cost (Weng et al., col. 3, lines 5-8, col. 4, lines 5-13).

7. Claims 7-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weng et al. (U.S. 5,879,577) in view of Liu et al. (U.S. 6,287,961).

Weng et al. teaches depositing a layer on a wafer comprising a uniform region of uniform thickness extending along a wafer surface and nearly to an edge of the wafer (Fig. 2, col. 1, lines 10-18, col. 3, lines 30-34). Weng et al. teaches a non-uniform region of non-uniform thickness corresponding to the edge of the wafer (Fig. 2). Weng et al. discloses coating a photoresist layer on the planarized layer, removing a portion of the coated photoresist layer corresponding to edge of the wafer and exposing at least the non-uniform region of the planarized layer (Fig. 2-4, col. 3, lines 34-55). Weng et al. shows wet etching at least the exposed non-uniform of the planarized layer, wet etching a portion of an exposed portion of the uniform region, and stripping a remaining portion

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of the coated photoresist layer (Fig. 5-7, col. 3, lines 55-65, col. 4, lines 2-6). Weng et al. teaches forming a pattern layer comprising a portion of the uniform region of the planarized layer (Fig. 7, col. 4, lines 2-10).

Regarding claims 7-12, Weng et al. does not specifically show planarizing the uniform region of the deposited layer using chemical mechanical polishing (CMP) process, the photoresist having the thickness as claimed. However, Weng et al. teaches the deposited layer being planar and the method could be applied to any substrate having a top layer (col. 1, lines 15-18, col. 4, lines 5-10). In addition, Liu et al. shows the steps of planarizing and employing a chemical mechanical polishing (CMP) process as conventional in the art (col. 3, lines 35-40, col. 8, lines 60-65). Liu et al. also shows forming a photoresist layer having a thickness of from about 7000 to about 15000 angstroms (col. 9, lines 50-55).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Weng et al. by including the teaching of Liu et al. The modification would provide a method of removing the edge bead with minimum interruption of the manufacturing process and without increasing the cost (Weng et al., col. 2, lines 10-15, col. 3, lines 5-8).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ku et al. (U.S. 5,773,082) teaches applying a photoresist on a wafer having a specific thickness. Liu et al. (U.S. 6,153,361), Brewer (U.S. 4,732,785), Iyer et al. (U.S. 5,494,849), and Tanigawa et al. (U.S. 5,328,871) show the step of

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removing the non-uniform region on the edge of the wafer as conventional in the art.

Liaw et al. (U.S. 5,998,279) teaches performing chemical mechanical polishing (CMP) process as well known in the art.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 703-305-0162.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 703-308-4905. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Maria Guerrero
Maria Guerrero
Patent examiner
April 28, 2003